

Applicant: Katrina Schmidt
Application Serial No.: 10/644,450

REMARKS

Claims 1, 3-4, 6, 8-11, 13-14, 16-19, 21-29, 31, 34, 36-42, and 44 remain in this application with claims 1, 26 and 39 in independent form. Claims 1, 25, 26, and 39 have been amended. Claims 2, 5, 7, 12, 15, 20, 30, 32-33, 35, 43, and 45-46 have been previously cancelled. No new matter is believed to be introduced by way of these amendments.

Claims 1, 3-4, 6, 8-11, 13-14, 16-19, 21-29, 31, 34, 36-42, and 44 stand rejected under 35 U.S.C. §103(a) as being unpatentable over United States Patent No. 5,340,900 to Spitzer et al. The Examiner contends that Spitzer et al. discloses preparations of polyurethane products meeting the claims of the subject application. However, the Examiner acknowledges that Spitzer et al. differs from the current claims in that the claimed ranges of the first polyol do not correspond exactly with the ranges disclosed in Spitzer et al. Further, the Examiner states that Spitzer et al. differs from the current claims in that Spitzer et al. does not disclose the densities of the polyurethane foam as claimed. The Examiner relies on the disclosure of a blowing agent within Spitzer et al. for a teaching that it would have been obvious to control the amount of the blowing agent to arrive at the claimed densities.

Referring to independent claim 1, as amended, the subject invention is directed toward a formulated resin component for use in a polyurethane spray foam system to produce a polyurethane foam having density of less than 1 pound per cubic foot. Claim 1 has been amended to require the blowing agent present in an amount of from 15 to 40 parts by weight based on 100 parts by weight of the resin component. It is to be appreciated that the blowing agent limitation was previously set forth in claim 25 and as such any additional Office Actions, other than a Notice of Allowance, should be non-final, as discussed below.

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The unique combination of the blowing agent, the first polyol, the second polyol, and the curing component, in the amounts now claimed, improves rise, gel, and cure times of the polyurethane foams formed therefrom. This improvement reduces and/or eliminates dripping when the components are sprayed. Further, primary amines of the curing component contribute to the open cells of the polyurethane foam which is believed to decrease water absorption, which was unexpected.

Spitzer et al. is directed toward a hardener for the production of polyurethane shaped articles. Spitzer et al. merely suggests that a blowing agent, particularly water, may be used. Spitzer et al. does not disclose, teach, or suggest, employing the blowing agent in the claimed amounts. Furthermore, none of the Examples disclosed in Spitzer et al. utilize a blowing agent in forming the foam and the Examples are silent as to the densities of the foams formed therefrom. As such, it would not have been obvious to one of ordinary skill in the art reviewing Spitzer et al. without impermissible hindsight to incorporate the blowing agent in the claimed amounts to arrive at a resin for use in a polyurethane spray foam system.

It is to be appreciated that polyurethane spray foam systems have unique requirements for pre-processing and post-processing, as set forth in the detailed description as originally filed. Examples of such unique requirements include dripping while spraying, dripping when burning, and low flame spread. Spitzer et al. does not disclose, teach, or suggest a resin for use in a polyurethane spray foam system. On the contrary, Spitzer et al. is directed toward polyurethane shaped articles that are formed in a mold by way of mechanical casting (see col. 11, lines 16-20) that do not undergo a brittle phase during curing. As such, one of ordinary skill in the art would not be motivated to modify Spitzer et al. without relying

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on impermissible hindsight to arrive at a resin component for a polyurethane spray foam system.

In view of the remarks set forth above, the §103 rejection is believed to be overcome. As such, claim 1 is believed to be allowable and claims 3-4, 6, 8-11, 13-14, 16-19, 21-25, which depend directly or indirectly from claim 1, are also believed to be allowable.

Referring now to independent claims 26 and 39, both claims require that the resin component and the isocyanate component be sprayed at an isocyanate index of from 15 to 70. As discussed in paragraph [0027] of the specification as originally filed, the primary amine groups are present in an amount such that unreacted hydroxyl groups remain in the foam, thus surprisingly reducing and/or eliminating dripping if the polyurethane foam is burned thereby meeting various flammability safety standards that was previously unlikely. The reduced dripping has not been previously been possible with polyurethane foams that have a lower density, especially when sprayed at volumetric ratios of 1:1, and as such the prior art low density foams do not meet the various flammability safety standards.

Spitzer et al. discloses utilizing an isocyanate number, or index, in a customary amount. Spitzer et al. specifically states:

“The reaction mixtures according to the invention comprise the polyisocyanate in the customary amount, in general corresponding to an isocyanate number (quotient of the number of isocyanate groups and the number of groups which can react with isocyanate groups in the reaction mixture, multiplied by 100) of between 70 and 130, preferably corresponding to an isocyanate number of between 90 and 110. A primary amino group here again corresponds to a hydroxyl group.” (See col. 7, lines 55-63).

Thus, Spitzer et al. merely discloses using a well known isocyanate index, as opposed to the subject invention which has discovered improvements in the resultant polyurethane foam when sprayed at an isocyanate index of from 15 to 70. The Examiner has

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not addressed this limitation and, thus, has presented no arguments or evidence in the remarks to provide a basis for establishing a *prima facie* case of obviousness as it relates to the isocyanate index as claimed. As such, the §103 rejection should be withdrawn and claims 26 and 39 are believed to be allowable. Claims 27-29, 31, 34, 36-38, 40-42, and 44, which depend directly or indirectly from these independent claims, are also believed to be allowable.

Claims 1, 3-4, 6, 8-11, 13-14, 16-19, 21-24 stand rejected under 35 U.S.C. §103(a) as being unpatentable over United States Patent Application Publication No. 2002/0169227 A1 to Allen et al. The Examiner contends that Allen et al. discloses preparations of polyurethane resins meeting the claims of the subject application. However, the Examiner acknowledges that Allen et al. differs from the current claims in that the claimed ranges of the first polyol do not correspond exactly with the ranges disclosed in Allen et al.

Allen et al. discloses a rigid polyurethane foam that comprises a syntactic glass phase and a cellular, non-syntactic phase. Allen et al. states that the foams are “conventionally made” (see Abstract). Further, Allen et al. requires the blowing agent to be present in an amount of from about 0.2 to about 2, preferably from 0.4 to about 1.5 parts by weight based per 100 parts by weight of other isocyanate-reactive materials (see paragraph [0039]).

Independent Claim 1 has been amended to require the blowing agent to be present in an amount of from 15 to 40 parts by weight based on the 100 parts by weight of the resin component. It is to be appreciated that Allen et al. discloses a rigid polyurethane foam, whereas the subject invention is claiming a resin component for use in a polyurethane spray foam system to produce a polyurethane foam having a density of less than 1 pound per cubic foot. One of ordinary skill in the art would not be motivated to modify Allen et al. without

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relying on impermissible hindsight to arrive at the subject invention as now claimed. Therefore, claim 1, as amended, is believed to be allowable and claims 3-4, 6, 8-11, 13-14, 16-19, 21-25, which depend directly or indirectly from claim 1, are also believed to be allowable.

Claims 1, 3-4, 6, 8-11, 13-14, 16-19, 21-29, 31, 34, 36-42, and 44 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Stone (United States Patent No. 5,006,569) in view of Nodelman et al. (United States Patent No. 6,586,487). The Examiner contends that Stone discloses resin formulations having the second polyol, blowing, agent, and curing component which meet the components as claimed and discloses articles formed therefrom having densities of less than 1 pound. The Examiner states that Stone does not disclose the first polyol, which the Examiner classifies as a cross-linker, but relies on Nodelman et al. for cross-linking polyols. Further, the Examiner contends it would have been obvious to employ the cross-linker of Nodelman et al. in the preparation of Stone for the purpose of controlling softening effect to arrive that the claimed invention.

Referring to independent claim 1 and as set forth above, claim 1 has been amended to require the blowing agent in an amount of from 15 to 40 parts by weight based on 100 parts by weight of the resin component. Stone states water is the preferred blowing agent and can be present in an amount from about 2 to about 6, preferably from about 3 to about 5 parts by weight per 100 parts by weight of total polyol present. Moreover, Stone states it is desirable *not* to increase the overall content of water in the foam formulation. Therefore, Stone teaches away from using the blowing agent in the amount from 15 to 40 parts by weight based on 100 parts by weight of the resin component.

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Applicant reiterates that Stone, when viewed as a whole, discloses reactive additives that are liquid salts. The liquid salts are formed from the reaction of CO₂ with a water soluble amine. In other words, Stone teaches away from using the water soluble amines without reacting with CO₂. Further, various examples that incorporate polyether amines having at least one primary amine group that have not been converted to the liquid salt, specifically Tables 3, 4, and 8. These examples having unreacted polyester amine produced unstable foams that physical data could not be obtained from. Whereas, those same examples having the polyether amines present as the liquid salts produced stable results. As such, Stone teaches away from using the polyether amines that are not converted to the liquid salt. Further, Stone states that increasing the water content in the foam formulation is disadvantageous because of the solubility of the amine. Therefore, one of ordinary skill in the art would not be motivated to employ the reactive additive of Stone in combination with a blowing agent content as claimed.

With reference to Nodelman et al., water is utilized as the blowing agent and is used in an amount of from about 1 to about 3 parts based on 100 parts of the polyol component. As such, reliance on Nodelman et al. does not overcome the deficiencies of Stone with regard to claim 1 as amended. Thus, claim 1 is believed to be allowable and claims 3-4, 6, 8-11, 13-14, 16-19, 21-25, which depend directly or indirectly from claim 1, are also believed to be allowable.

Referring now to independent claims 26 and 39, the Examiner has not addressed the significant limitation of the claimed isocyanate index and has failed to provide any arguments for the limitation of reacting the resin component and the isocyanate component in a ratio having an isocyanate index of from 15 to 70. As discussed above, the subject

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invention provides the advantageous properties of little or no dripping when sprayed and improved burn characteristics when the polyurethane foam is formed at such an isocyanate index.

In order to support the *prima facie* case of obviousness, the PTO must satisfy three requirements. First, the prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or to combine references. Second, the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. In other words, a hindsight analysis is not allowed. Lastly, the prior art reference or combination of references must teach or suggest all the limitations of the claims.

Applicant respectfully submits that the *prima facie* case of obviousness has not been satisfied. Specifically, the claim limitation of reacting at an isocyanate index of from 15 to 70 is not suggested or disclosed in the references alone or in combination. Stone discloses an isocyanate index of 102 to 110 and Nodelman et al. discloses an index of at least 80. As such, the §103 rejection should be withdrawn and independent claims 26 and 39 are believed to be allowable. Claims 27-29, 31, 34, 36-38, 40-42, and 44, which depend directly or indirectly from these independent claims, are also believed to be allowable.

With reference again to the claim element of reacting the resin component and the isocyanate component having an isocyanate index of from 15 to 70, it is noted that this limitation was *originally* presented in independent claims 26 and 39. This claim element has not been addressed by the Examiner and, as a result, Applicant respectfully requests that any subsequent Office Action, other than a Notice of Allowance, addressing such claim element

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be non-final as set forth in MPEP 706.07. Also, the amendment to claim 1 was previously set forth in dependent claim 25, and as set forth in MPEP 706.07, any subsequent Office Action should be non-final.

Accordingly, it is respectfully submitted that the Application, as amended, is now presented in condition for allowance, which allowance is respectfully solicited. Applicant believes that no fees are due, however, if any become required, the Commissioner is hereby authorized to charge any additional fees or credit any overpayments to Deposit Account 08-2789.

Respectfully submitted
HOWARD & HOWARD ATTORNEYS, P.C.

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Date

/Kristopher K. Hulliberger/
Kristopher K. Hulliberger, Reg. No. 53,047
The Pinehurst Office Center, Suite #101
39400 Woodward Avenue
Bloomfield Hills, Michigan 48304
(248) 723-0453